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## Effect of neurodynamic sliding technique on bilateral hamstring flexibility and balance in normal elderly population

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### Abstract

The objective of this study was to determine the effectiveness of Neurodynamic sliding technique on hamstring flexibility and postural balance in elderly population. This study was randomized experimental trial. A total of 30 subjects (14 females and 16 males), confirmed by the subject specialist were selected on the basis of exclusion and inclusion criteria. All subjects began with a single measure of passive SLR on their dominant leg. Range of motion was less than 75° and balance was assessed by Berg Balance Scale. Measurements were performed on very first day of the intervention. Subjects were then treated with Neurodynamic Sliding Technique on 6 different days over two weeks. Results were noted and compared on the 1 day (pre) and after 2 weeks (post). Data was analysed using MS EXCEL. Student's test was applied for the comparison of all variable in elderly population treated with Neurodynamic Sliding Technique in improving balance and straight leg raise. The evaluation of results was done pre and post intervention on the two parameters which were balance by BBS and passive range of motion of SLR by Goniometer. It showed improvement in PROM (SLR) test and berg balance score on the subsequent days i.e. day 1 (Before) and 2 weeks (After). Results from this study show that an isolated Neurodynamic Intervention provides a greater immediate increase in Passive Straight Leg Raise. The results confirmed our initial hypothesis that an isolated neurodynamic sliding technique would provide a greater immediate improvement in hip flexion, assessed by Passive Straight Leg Raise. Limitation of the study was Small sample size and lack of control group. It was concluded that Neurodynamic sliding technique was effective in increasing the hamstring flexibility and improving postural balance in elderly population.

**Keywords:** neurodynamic sliding technique, bilateral hamstring flexibility, normal elderly population

### Introduction

Falls are common among the elderly population. The major reason of disability and mortality in older people is associated with it [12, 34]. In older person, it sets the limit of immobility, weakness and acute and chronic health impairment. Diminished or decrease function which is caused by injury, fear of fall, limitation of activity, and loss of mobility result in falls [38]. A fall is an event which is done unintentionally which would result in person coming to rest on the ground or another lower level. The prevalence of fall is more in women than men [12].

The balance impairment is the leading cause of falls. Balance is dependent on the strength of muscle, mobility of joint as well as healthy feet. Balance during walking and standing also depend on many factors. A proper balance requires input from vision, auditory and proprioceptors [7]. In older age there is a degeneration of vestibular system and impaired proprioception in feet which could result in fall [1].

Reduced hamstring flexibility in individual may reveal limited range in passive straight leg raise test (SLR) because of altered neurodynamics which affect the sciatic, tibial and common fibular nerve. Resting muscle length may be influenced by abnormal posterior lower extremity neurodynamics which lead to changes in the perception of stretch or pain. It has been suggested that providing a movement or stretching to the lower extremity could alter neurodynamics and lead to modification of the sensation. Some studies stated that neurodynamics is effective for improving pain, flexibility and muscle strength and as well as

postural balance [38]. Neurodynamic mobilization has proven to be an efficient intervention in various musculoskeletal condition. A study stated that a neurodynamic mobilization might increase hamstrings flexibility more efficiently than static stretching in healthy male subjects with a tight hamstring. Neurodynamic mobilization decrease the neural mechanosensitivity and may be a helpful technique in the management of hamstring flexibility [13].

Now, In present study we applied neurodynamic sliding technique on elderly people to see the effectiveness on hamstring flexibility and postural balance.

Aim of the study was to determine the effectiveness of Neurodynamic sliding technique on hamstring flexibility and postural balance in elderly population.

Objectives of the study was to evaluate the effectiveness of Neurodynamic sliding technique on hamstring flexibility in elderly population and to evaluate the effectiveness of Neurodynamic sliding technique on static postural balance in elderly population

**Methodology**

30 subjects were targeted. Sampling was convenient sampling with Experimental study design. Inclusion criteria were Gender – males and females between the age of 60- 70 years. Subjects whose score was between 41-45 in Berg balance scale (BBS) scale Passive straight leg raise (PSLR) was less than 75° for hamstring flexibility with goniometer. Exclusion criteria includes any hamstring injury in past one year, any neurological or orthopedic disease affecting the lower limb, exceeding 75° in initial passive straight leg raise, score less than 41 and more than 45 in Berg balance scale, any abnormal cardiac conditions, any psychological condition.

The present study was designed to examine the impact of 2 weeks targeted treatment protocol (Neurodynamic) to check the improvement in hamstring flexibility and balance in asymptomatic old individuals. Patients were chosen according to the inclusion and exclusion criteria. Informed consent was obtained from the patients. All subjects began with a single measure of passive SLR on their dominant leg. Range of motion was less than 75° and balance was assessed by Berg Balance Scale. Measurements were performed before intervention. Subjects were then treated with Neurodynamic sliding technique on 6 different days over two week. Results was noted and compared on the 1 day(before) and after 2 weeks(after).

**Result**

Thirty subjects were taken in this study with the mean age of 68.16± 3.30 respectively as shown in table.

**Table 1:** Demographic chart

	Mean ± Std. Deviation
Mean Age	68.16± 3.30
Gender	No. of males-16 No. of females-14

The evaluation of results were done pre and post intervention on the two parameters which were balance by BBS and passive range of motion of SLR by Goniometer.

It showed improvement in PROM (SLR) test and Berg Balance Score on the subsequent days i.e.day1(pre), 2 week (post).

**Table 2:** comparison of PROM between day 1 and after 2 weeks

Variables	Sample size	mean	Standard deviation	t value	P value
SLRBT	30	60.5	6.03	2.68	0.004
SLRAT	30	64.4	5.17	2.57	0.009

In pre intervention phase, the mean of PROM on Day 1 was 60.5±6.03.

In post intervention phase, the mean of PROM after 2 week was 64.4±5.17.

When comparison of mean value is done in post intervention the result was significant.

**Table 3:** comparison of BBS between day 1 and after 2 weeks

Variable	Sample size	mean	Standard deviation	T Value	P Value
BBSBT	30	42.6	1.29	1.97	0.02
BBSAT	30	43.3	1.31	2.05	0.05

In pre intervention phase, the mean of BBS on Day1 was 42.63±1.2.

In post intervention phase, the mean of BBS after 2 weeks was 43.3±1.3.

When comparison of mean value is done in post intervention the result was significant.

The difference of improvement was statistically significant between day 1 and after 2 weeks.

**Discussion**

Neurodynamic mobilization is an effective treatment modality, although support of this suggestion is primarily unreliable. This technique used to regain the movement and elasticity of nervous system by re-establishing the axoplasmic flow. Thus, restoring nerve tissue homeostasis, which could be the possible mechanism of improvement in Neurodynamic solution.

Increasing hamstring flexibility has been suggested as an important factor in the treatment and prevention of lower extremity overuse injuries. Much of the research on increasing hamstring has focused on the varying modes of stretching, such as proprioceptive neuromuscular facilitation, static stretching, plyometric stretching and ballistic stretching. They have also compared differing stretch intensities and frequencies. Very few studies have examined the effect of neurodynamic intervention on hamstring flexibility and the results of this study can be seen as adding further evidence for the potential role of neural tissue mechanosensitivity in limiting the SLR [34].

It has been shown that this technique decreases mechanosensitivity of the neural tissue by providing movement and this lead to change in neurodynamics and it also change the perception of stretch and pain (sensory theory) and would result in increase flexibility [48].

Elderly population begins slowing down their movements and even gives up their regular routines to avoid injury and falls as their bodies get weaker. The hips and knees are especially prone to cartilage depletion and goes into muscle shortening.

Due to increase in flexibility, the postural balance is also improved. It has been stated that hamstring muscle play a important role in the activity of daily living such as walking, running and jumping. It is important muscle which involved in maintaining balance and posture in standing position. If hamstring flexibility increases will also lead to improve balance [2].

Current evidence suggests altered posterior lower extremity neurodynamic influence resting muscle length and increase mechanosensitivity.

Results from this study show that an isolated neurodynamic intervention provides a greater increase in passive straight leg raise. The results confirmed our initial hypothesis that an isolated neurodynamic sliding technique would provide a greater improvement in hip flexion, assessed by passive straight leg raise.

### Conclusion

The result of the study elicit that, the Neurodynamic Sliding Technique was effective in increasing the hamstring flexibility which was assessed by passive straight leg raise and it was also helpful in improving postural balance which was assessed by berg balance scale in elderly population.

It is suggested that findings of the present study can be used for longitudinal study over period of time. It is also suggested to add Neurodynamic Sliding Technique as treatment protocol for preventing falls and improving balance

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